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Authentication of copy of documents concerning the Patent
application for INDUSTRIAL INVENTION No. RM2003A000429 filed on
17.09.2003

It is hereby certified that the attached copy is the true
copy of the original documents filed with the above
mentioned patent application whose data are shown in
the enclosed filing certificate

Rome, 25 October 2004

Director of the Division
(signature)
Giampietro Carlotto

SEAL



FORM A
DUTY STAMP

TO THE MINISTRY OF INDUSTRY COMMERCE AND HANDICRAFT
Italian Patent and Trademark Office - ROME
Patent Application for Industrial Invention, filing of reserves,
advanced opening to public inspection

A. Applicant

- 1) Name SIPA SOCIETA' INDUSTRIALIZZAZIONE PROGETTAZIONE AUTOMAZIONE
SPA - SP
Residence 31029 VITTORIO VENETO code 0118790268
- 2) Name
Residence code

B. APPLICANT'S REPRESENTATIVE BEFORE IPTO

Surname, Name Giulio Mariani et al Fiscal code
Name of the corresp. office NOTARBARTOLO & GERVASI S.p.A.
Address Via Savoia No. 82 City ROMA code 00198 prov RM

C. ELECTED DOMICILE OF THE ADDRESSEE

Address AS ABOVE No. city code prov

D. TITLE proposed class, (sec./cl./ucl.) group/subgroup

HEATED BLOW MOULD FOR THERMOSTABILIZING TREATMENT

ADVANCED OPENING TO PUBLIC INSPECTION yes___ no X
in presence of amendment request: date no. of ref.:

E. NAMED INVENTORS

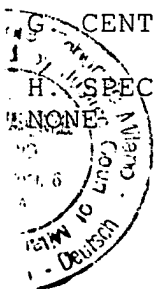
surname, name	surname, name
1) ZOPPAS Matteo	3) CHIAROTTO Giovanni
2) ARMELLIN Alberto	4) VARASCHIN Michele

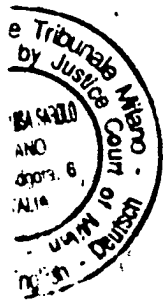
F. PRIORITY

Country or Exhibition Type of Priority Appln. No. Appln. date
Encl (yes/yes)
1) None
2)

G. CENTRE FOR COLLECTING MICROORGANISMS' CULTURES, denomination

H. SPECIAL NOTES





ENCLOSED DOCUMENTS

No. Doc.

Doc.1) 1 prov. no. sheets 09

Doc.2) 1 prov. No. Draw. 03

Doc.3) 1 res. X

Doc.4) 0 res.

Doc.5) 0 res.

Doc.6) 0 res.

Doc.7) 0 res.

abstract with main drawing, spec.
and claims (compulsory 1 copy)
drawings (compulsory if cited in
the description, 1 copy)
power of attorney or reference to
general power of attorney
designation of inventor

priority doc. with Italian transl

authorisation or assignment deed

complete name of the applicant

RESERVES DISSOLUTION

Date

Filing. No.

Comparison single prio.

8) PAYMENT RECEIPT OF Euro 188,51 compulsory

filled in on 16.09.2003 The applicant's signature Dr. Giulio
Mariani NOTARBARTOLO & GERVASI SPA

follows yes/no NO

We require a certified copy of the present deed yes/no YES

PROVINCIAL OFFICE OF INDUSTRY COMMERCE HANDICRAFT OF ROME code 58

FILING CERTIFICATE Application no. RM2003A000429 Reg. A

The year 2003, the day 17 of the month of September

The above mentioned applicant(s) has(have) presented to me
undersigned the present application consisting of no. 00 additional
sheets for the grant of the above patent.

I. NOTES OF THE RECORDING OFFICER

THE DEPOSITER
(signature)

THE RECORDING OFFICER
(signature)





FORM A

ABSTRACT OF THE INVENTION TOGETHER WITH MAIN DRAWING, DESCRIPTION
AND CLAIM

Application No. RM2003A000429 Reg.A Filing date 17.09.2003
Patent No. Date of grant

A. Applicant
Name
Residence

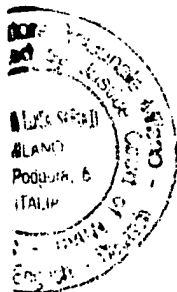
D. TITLE

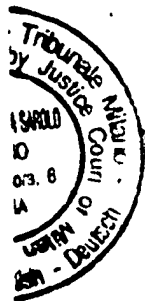
HEATED BLOW MOULD FOR THERMOSTABILIZING TREATMENT

L. ABSTRACT

A heated blow mould for the thermostabilizing treatment, or the heat-set process, where at least a heating system is housed between the mould and mould holder. Said system consists of a set of tubular electric resistors, which are parallel to the generator of the mould and of the item to be moulded, connected to each other by additional electric resistors, which are basically transversal in relation to the first resistors and placed in areas requiring greater heat.

M. DRAWING
Fig. 1





Description of the Patent Application for the industrial invention
entitled:

HEATED BLOW MOULD FOR THERMOSTABILIZING TREATMENT

Applicant: SIPA Società Industrializzazione Progettazione
Automazione SpA

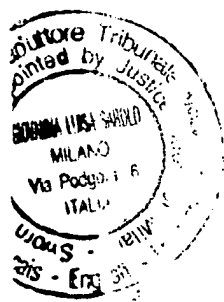
Residing in 31029 Vittorio Veneto (TV)

named inventors: Matteo ZOPPAS, Alberto ARMELLIN, Giovanni
CHIAROTTO, Michele VARASCHIN.

filed on

under No.

* * * * *



Technical Field

This invention relates to a heated blow mould for the thermostabilizing treatment or the heat-set process. More specifically, it relates to a blow mould where the heating element consists of at least a set of tubular electric resistors connected to each other.

Background Art

Today, plastic containers in different shapes and sizes – for example, bottles – are often made with a process comprising a blow moulding stage wherein the thermoplastic material, possibly in the form of a preform (i.e. a smaller, pre-moulded workpiece that is normally cylindrical in shape), is blow moulded in a heated mould to create the final container.

To date, two general known systems are used to heat the mould: the first uses film electric resistors placed near the inside surface of the mould, and the second uses a heating element consisting of a hot fluid that circulates in a coil placed in the mould.

Although the heating system with film electric resistors (described, for example, in US patents 5.007.818 and 5.234.637) has excellent temperature modulation properties, it has a poor heating value. As a result, this type of heating system must be placed as near as possible to the surface of the mould that comes into contact with the material to be moulded. The drawback of this requirement is that it is necessary to have several moulds (i.e. one for each type of container or bottle to be moulded) equipped with a blanket of film electric resistors near the inner surface; obviously, this increases costs.

The heating system with the circulating hot fluid has greater thermic inertia than the other system, although it has a good heating value.

Furthermore, in today's rotary moulding machines, it presents significant problems in terms of assuring the watertightness of the location where the fixed and the rotary parts come into contact and of the ducts that convey the hot fluid, generally oil, to the mould, which opens to house the preform and closes to unload the finished product at high rates. These requirements add bulk to the machine and, thus, mean larger dimensions and higher costs. Another drawback is the

poor thermal efficiency due to the dissipation of the thermal power in the rotary device since it is not possible to prevent the ducts for delivering the hot fluid from being far away from those for removing the cold fluid.

Today, thus, there is a need for a mould heating system for use in rotary blow moulding machines that is simple and effective.

Objects and Brief Description of the Invention

It is an object of this invention to provide a single electric heating system that resolves the aforementioned problems and is suitable for use with any type of container or bottle, easy to control, and energy efficient.

The blow moulding device in accordance with this invention consists of a single mould holder that houses, each time, the mould specific to the container (for example, a bottle) to be made. Furthermore, the device consists of a heating system that is housed between the mould holder and mould. Said system consists of at least a set of tubular electric resistors, which are placed parallel to each other and the generator of the container or bottle, and of other electric resistors, which are normally placed transversal to said first resistors and in areas where more power is dissipated or at least in areas requiring more electric power. Said tubular electric resistors can be connected electrically to said additional electric resistors.

If necessary, at least one of said sets of tubular electric resistors can be placed nearer the inside surface of the mould holder that is in contact with the mould.

At least another of said sets of electric resistors can be placed nearer the outside surface of the mould holder in order to limit the outward dispersion of heat, insuring greater thermal uniformity inside the mould. A layer of thermally insulating material can be used in order to limit further useless and costly losses of heat in the environment.

Detailed Description of the Invention

Other objects and advantages of the invention shall be readily apparent from this more detailed description of the currently preferred versions of the invention, given as nonlimiting examples of the scope

of the invention and in conjunction with the following accompanying

schematic drawings:

Figure 1 shows a perspective view of half the mould holder and

mould assembly,

Figure 2 shows an exploded perspective view of the assembly

depicted in Fig. 1, and

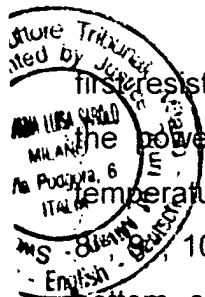
Figure 3 shows a mould holder with a system of tubular electric resistors in accordance with the invention adhering to the inside surface of said mould holder.

In the blow moulding machines suitable for the device in accordance with the invention, the moulds are of the split-mould kind (i.e. divided into two symmetrical halves) that open to house the preform and unload the moulded product and close and are clamped tightly during moulding.

Only one of said halves is shown in the figures, since it is taken for granted that the other half is perfectly symmetrical. This symmetry is limited to the geometry. In practice, since heat exchanges with the outside environment are typically asymmetrical, power must be supplied in an asymmetric way for the two mould halves to have a thermal symmetry; this supply is managed automatically by the control system. The results of the thermostabilizing treatment is to obtain uniformity throughout the surface of the container, even if the shape of the container is not symmetrical (for example, containers with handles).

Figure 1 shows a shell half (1) of the mould holder that houses a shell half (2) of the mould that, in turn, features an inside mould cavity shaped like the container (for example, a bottle) to be made. A thermally insulating wall (3) decreases the losses of heat, generated by the electric resistors, into the environment.

Figure 2 shows, between the mould holder (1) and mould (2), the placement, near the mould (2), of a first set of tubular electric resistors, which are parallel to each other and to the generator of the inside cavity of the shell half (3', 4', 5', 6', 7', 8'), connected to each other by resistors (7'', 8'', 9'', 10'', 11''), placed basically transversal to said



resistors. The spacing between said heating resistors depends on the power required to heat the inside mould cavity to the optimal temperature for blow moulding. The transversal heating elements (7", 10", 11"), or resistors, are placed near the end parts, top and

bottom, of the mould. This placement is due to the fact that, to obtain perfect moulding results, it is necessary to have, in these areas, a certain amount of cooling (for example, to prevent distortions to the neck of the container or bottle) during forming and a greater amount of heat to compensate for the greater thermal dissipation caused by the significant curvature of the container.

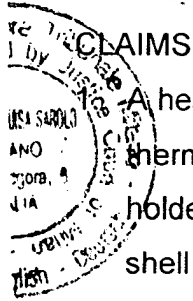
Inside the shell half (1), there is another tubular resistor (3), together with a transversal resistor (7), of a second set of resistors, which is better shown in Fig. 3; the resistors of said second set are positioned analogously to the corresponding resistors of said first set.

Said first set of resistors can be eliminated, or disabled, if not required for the type of bottle to be made.

Figure 3 shows a detail view of the housing of the different tubular (3, 4, 5, 6) and transversal (7, 8, 9, 10) electric resistors found on the inside wall of half the shell (1).

If a greater amount of heat is required along the side wall of the container to be moulded than in the neighbouring areas (for example, to make significant constrictions, or deformations, to the section of the container, or bottle, to be made), other transversal heating elements can be used in said areas. These additional elements can be similar to the others (7, 8, 9, 10), but some resistors (3, 4, 5, 6) can be shaped appropriately with loops. Obviously, said loops can be placed, without problem and as necessary, in every area of the mould.

Thus, it is easy to understand how tubular electric resistors, if necessary equipped with loops as specified above, connected to each other at the ends with transversal tubular electric resistors make it extremely simple to handle and control the production of containers, especially bottles, with the thermostabilizing treatment or heat-set process.



A heated blow mould for making thermoplastic containers using the thermostabilizing treatment or heat-set process where a mould holder with a wall of a desired thickness is divided into two mirror shell halves each housing half a mould with a specific shape for making the container to be made and where, between said mould holder and said mould, at least a heating system is housed consisting of a set of first electric heating elements placed parallel to the generator of the container to be made and additional electric heating elements, which are basically transversal to said first elements and placed in areas where more heat must be supplied.

2. A heated mould as claimed in claim 1 where said first electric heating elements are tubular electric resistors and are arranged parallel to each other.

3. A heated mould as claimed in claim 1 where said first and said additional electric heating elements are electrically connected to each other.

4. A heated mould as claimed in claim 1 where said additional heating elements are placed at the top and bottom ends of the container to be made.

5. A mould as claimed in claim 1 where at least one of said heating systems is placed near the inside surface of the mould holder, while at least another of said heating systems is placed nearer the outside face of the mould.

6. A mould as claimed in claim 1 where a layer of thermally insulating material is placed at the outside surface of the mould holder.





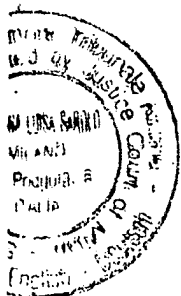
Rome, 16 September 2003

On behalf of SIPA Società Industrializzazione
Progettazione Automazione SpA

The Representative

Dr. Giulio Mariani

NOTARBARTOLO & GERVASI S.p.A.



DECLARATION UNDER 37 CFR 1.68

I, Giovanna Luisa Sarolo, declare

That I reside at Via Podgora 6, Milan, Italy;

That I am familiar with the Italian and English languages;

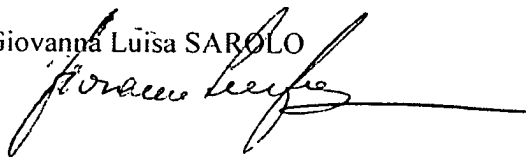
That I am a Sworn Translator, appointed by the Court of Milan, Italy;

That I have prepared the attached translation of the Italian Patent Application No. **RM2003A000429** filed on **17 September 2003** with the title: "Heated Blow Mould for Thermostabilizing Treatment", said Italian language document being already filed at WIPO during the PCT procedure.

That the attached translation is complete and accurate and fairly reflects the meaning and content of said Italian language document.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such wilful false statements may jeopardize the validity of the application or any patent issued thereon.

Giovanna Luisa SAROLO



Milan, ITALY, 27th October 2009